

DEVELOPMENT OF LINEN AND ITS MIXTURE WITH COTTON AND POLYESTER KNITTED FABRICS

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ABSTRACT

Firstly, linen, cotton and polyester yarns were procured from the market and fabric was manufactured by using flatbed knitting machine of 100% linen, linen: cotton and linen: polyester in the plain and rib knits. After that scouring was done and different physical parameters were tested which includes courses and wales, thickness, weight per unit area, pilling, dimensional stability, stiffness, crease recovery, bursting strength and drape coefficient and then comparison was done in between the different fabrics of the same knit and results were calculated on the basis of different parameters calculated.

KEYWORDS: Knitted Cotton Polyester Mixture Fabrics

INTRODUCTION

Textiles have always a central role in the evolution of human culture by being at the forefront of both technological and artistic development. Knitting is the second most frequently used method of fabric construction. Knitted fabrics may be constructed with a single yarn that is formed into interlocking loops by the use of hooked needles.

Knitting is a method by which thread or yarn is turned into cloth or other fine crafts.

In this research an attempt has been made for producing linen and its mixture (linen: cotton and linen: polyester) by using flatbed machine and then testing will be done.

OBJECTIVES

- To prepare knitted fabric from pure linen and mixture of linen with polyester and cotton.
- To find physical parameters of knitted fabrics.

DELIMITATIONS

- Study was confined to the yarn of 7.5 yarn count i.e. 24 nm.
- Study was confined to the linen knitted fabric with the mixture of cotton and polyester only.
- Study was confined only to the flat bed knitting.

METHODOLOGY

The study was undertaken to evaluate the physical parameters of linen fabrics and its blends. The details pertaining to material used and the methods adopted during the course of investigation are presented in this chapter under following

sub sections.

MATERIALS USED

Yarn:- Yarns were procured from Atul textiles and Bhawna textiles, Muradnagar Ghaziabad.

INSTRUMENT USED

Table 1

S. No.	Instrument	Purpose
1	Sasmira launder o meter	For washing
2	Eureka stiffness tester	Stiffness
3	Eureka crease recovery tester	Crease recovery test
4	Pick glass	Use to count wales and course
5	Thickness tester	To determine the thickness of fabrics
6	ICI Pilling tester	For pilling test
7	Drape o meter	To determine drape of fabrics
8	Digital bursting strength tester	Determine bursting strength of the fabric
9	Electronic weighing balance	To determine weight

MANUFACTURING OF THE FABRIC

After procuring the yarn, fabrics were prepared by using 100% linen, linen: cotton mixture yarns (50:50%) and linen: polyester mixture yarns (50:50%) on computerized flat bed knitting machine. Fabrics were manufactured by using weft knitting technique in plain and rib knit.

PRE TREATMENT

Experiment design was used for the study and the study was conducted under following steps:

Scouring of the Linen Fabric: Non fibrous constituents such as dirt, dust, oil, waxes, mineral etc. were removed by the scouring of linen fabric.

Table 2: Recipe Used for Scouring Treatment

S. No.	Chemical	Amount
1	Sodium Carbonate	2 g/l
2	Ezee	5 g/l
3	Material liquor ratio	1:30
4	Temperature	60 ⁰ C
5	Time	30minutes

Procedure

The fabric get dip in the container containing scouring solution 2g/l of sodium carbonate and 5 g/l of Ezee and treated for duration of 30 minutes at 60⁰C temperature. The fabric was taken out from the bowl, rinsed thoroughly and squeezed gently. The scoured fabric was dried at room temperature. (Trotman, 1970)

Determination of Physical Properties:- Fabric thickness, weight per unit area, wales per inch and courses per inch, bursting strength, pilling, stiffness, drapeability, fabric shrinkage and crease resistance.

RESULTS AND DISCUSSIONS

Physical Properties of Knitted Fabrics Courses and Wales per Inch

Table 3

FABRIC	Plain Knit		Rib Knit	
	Courses	Wales	Courses	Wales
100% Linen	22	18	22	26
Linen : Cotton	20	18	24	26
Linen : Polyester	20	18	24	24

From the above table it was observed that the fabrics have higher number of courses than wales and only the linen: polyester rib knit fabric is a balanced fabric among all the fabrics observed.

Thickness (mm)

Table 4

Fabric	Plain Knit	Rib Knit
100% Linen	1.03	1.68
Linen : Cotton	.90	1.71
Linen : Polyester	1.05	1.55

From the above table it was observed that the linen: cotton fabric has minimum thickness and the linen: polyester has maximum thickness and rib knit fabrics was thicker as compared to plain knit fabrics. Fabric thickness is achieved by the manipulation of yarn construction and the application of some types of finishes. In these fabrics none of the finishes are applied so the variation in the thickness may due to the thickness of the yarn used for knitting the fabric.

Fabric Weight (gm/m²)

Table 5

Fabric	Plain Knit	Rib Knit
100% Linen	6.89	11.10
Linen : Cotton	6.52	9.67
Linen : Polyester	9.21	12.47

From the above table it was observed that the linen: cotton fabric is very light in weight and linen: polyester is a heavy weight fabric. It shows that cotton yarn was light in weight than polyester yarn as the linen yarn and its amount was same in both the fabrics. The rib knit fabrics have more weight than the plain knit fabric and one reason for this is the amount of yarn used as rib knit requires more yarn in amount than a plain knit fabrics requires for its formation.

Pilling

Table 6

Fabric	Plain Knit	Rib Knit
100% Linen	5	5
Linen : Cotton	4	4
Linen : Polyester	2	2

From the table it was observed that the pilling problem mainly occurs in blends or blended fabrics than the 100% fabrics and the large numbers of pills are shown in synthetic fibers as compared to natural fibers. In a fabric made from a

blend of fibers there are more pills than in a similar fabric made from only one fiber because of incompatibility between the fibers. The major problem with polyester blend has been that of pilling. Polyester fibers are much stronger than natural fiber. With abrasion during use, some of the polyester fibers break. They can't fall away from the surface of the fabric as they are tied down with strong fibers called as pills.

Cotton/Linen formed very few pills because natural fibers are weaker than synthetics so pills break down easily from surface of the fabric.

Dimensional Stability (in Percent)

Table 7

Fabric	Plain Knit		Rib Knit	
	Course Wise	Wales Wise	Course Wise	Wales Wise
100% Linen	6.25	2.5	7.5	5
Linen : Cotton	12.5	0	0	5
Linen : Polyester	2.5	1.25	2.5	3.75

From the table it was observed that linen: cotton plain knit shows maximum shrinkage in course wise direction and there is no shrinkage in its wales wise direction and also no shrinkage is shown in linen: cotton rib knit fabric in warp wise direction.

Individual variations were observed among different knitted fabrics shrinkage was more in course wise direction as compared to wale wise direction. This is because weft knit fabrics is knitted with single yarn which runs horizontally across the fabric.

Stiffness

Table 8

Fabric	Plain Knit	Rib Knit
100% Linen	.39	.35
Linen : Cotton	.40	.77
Linen : Polyester	.47	.64

Form the above table it was observed that rib knits are stiffer than plain knit except 100% linen fabric in which plain knit is stiffer than rib knit.

Crease Recovery

Table 9

Fabric	Plain Knit		Rib Knit	
	Course Wise	Wales Wise	Course Wise	Wales Wise
100% Linen	96.1	93.7	94.1	91.8
Linen : Cotton	92.8	102.2	102.2	94.4
Linen : Polyester	94.7	94	95.3	90.8

From the table it was observed that the crease recovery angle is more in course wise direction than the wales wise direction and the linen: cotton knitted fabric have the same crease recovery angle in the plain knit wales wise and the rib knit course wise.

Bursting Strength (kg/cm²)**Table 10**

Fabric	Plain Knit	Rib Knit
100% Linen	7.53	9.40
Linen : Cotton	5.43	9.83
Linen : Polyester	15.46	11.33

From the table it was observed that the strength of fabric varies with the type of knit as rib knit fabric is stronger than plain knit fabric and the linen: cotton fabrics have lowest strength and linen: polyester fabrics are strongest among the three fibers it means that a large amount of force is required to burst the fabric which shows that the fabric durability is best in comparison to other knitted fabrics.

Drape Coefficient (in percent)**Table 11**

Fabric	Plain Knit	Rib Knit
100% Linen	30	34.27
Linen : Cotton	32.55	38.54
Linen : Polyester	33.41	32.55

From the above table it was observed that the plain knits have more drapes as compared to rib knit fabrics because rib knits fabrics have more stiffness. In plain knit Linen: polyester shows maximum drape and in rib knit linen: cotton shows maximum drape which shows that linen is a stiff fabric which may because of the stiffness of yarn. One must choose the fabrics according to the drape of the recommended style of garment.

CONCLUSIONS

Resent study is a step towards product innovation. It explores the possibility of developing linen, linen: polyester and linen: cotton knitted fabrics for organized sector. The knitwear industry in India is poised for major take-off in the world of fashion as designers find a lucrative outlet for their creative ideas. This study is eminently suited to make small but important contribution in accomplishing the gigantic task of finding gainful employment in urban areas. This study will help to add new varieties in knitted fabrics. The result will be useful to knitted cottage industry. Consumer will be benefited and get fine and good quality of knitted fabrics.

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